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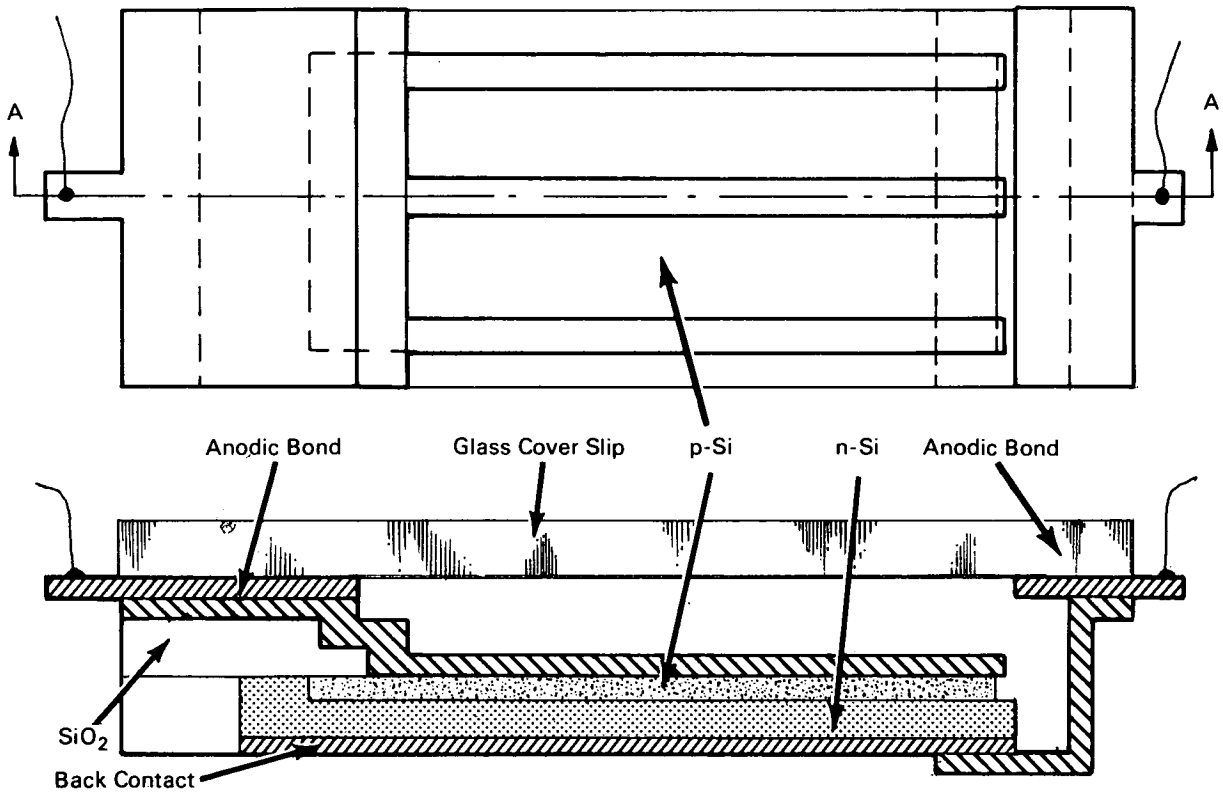
NASA TECH BRIEF

Glass-to-Metal Bonding Process Improves Stability and Performance of Semiconductor Devices



Detail A-A

The problem:

Photodiodes and photovoltaic devices (solar cells) require glass coverslips which provide protection and in certain applications, function as an optical filter. Commercial adhesives that bond the coverslip to the device surface darken and lose their adhesive properties when exposed to high temperatures and ultraviolet radiation.

The solution:

The need for adhesive is eliminated by the novel anodic bonding scheme in the figure. (The details of the cross section are simplified in order to highlight the important features of the bonding process.) The coverslip is hermetically bonded directly to the surface of the device.

(continued overleaf)

How it's done:

A metallization pattern matching that of the photodiode is evaporated (or sputtered) onto the glass coverslip. The deposited metal, e.g. molybdenum, has thermal expansion properties similar to the glass coverslip. The coverslip is precisely aligned above the photodiode and then bonded to the metallization pattern on the photodiode surface. The entire operation requires relatively low temperatures (less than 560°C). No fluxes, adhesives or other intermediary materials are required and the metals and glass remain solid throughout the bonding process. This packaging technique can easily be applied to more elaborate geometries and other semiconductor devices including transistors in large-scale integration arrays.

Note:

The following documentation may be obtained from:

Clearinghouse for Federal Scientific
and Technical Information
Springfield, Virginia 22151
Single document price $3.00
(or microfiche $0.65)

Reference:
NASA-CR-85026 (N67-36920), Interconnection and Encapsulation of Integrated Circuits by Anodic Bonding

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made by NASA, Code GP, Washington, D.C. 20546.

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